

PATENT CLAIMS

1. Process for the production of a multi-layer electrode or electrode assembly, wherein a first layer is rolled onto a carrier and at least one additional function layer is produced by spraying on a powder.
2. Process as defined in claim 1, characterized in that the powder is sprayed on dry.
3. Process as defined in claim 1 or 2, characterized in that the roller application is brought about by means of one or more heated rollers.
4. Process as defined in any one of the preceding claims, characterized in that the carrier is designed as a carrier mesh.
5. Process as defined in any one of the preceding claims, characterized in that the carrier is produced from a metallically conductive material.
6. Process as defined in any one of the preceding claims, characterized in that the carrier is produced from high-grade steel.
7. Process as defined in any one of claims 1 to 5, characterized in that the carrier is produced from silver-plated nickel.

8. Process as defined in any one of claims 1 to 5, characterized in that the carrier is produced from titanium.
9. Process as defined in any one of claims 1 to 4, characterized in that the carrier comprises an electrically non-conductive material, a conductive contact layer being or having been applied to said material.
10. Process as defined in any one of the preceding claims, characterized in that a sprayed-on function layer is a reaction layer.
11. Process as defined in claim 10, characterized in that a reaction layer is produced by spraying on a catalyst carrier material on a carbon basis.
12. Process as defined in claim 11, characterized in that platinum is used as catalyst material.
13. Process as defined in any one of the preceding claims, characterized in that a sprayed-on function layer is a barrier layer.
14. Process as defined in claim 13, characterized in that a mixture of carbon and a hydrophobing material is used for forming a barrier layer.
15. Process as defined in claim 14, characterized in that PTFE is used as hydrophobing material.
16. Process as defined in any one of claims 13 to 15, characterized in that the barrier layer has a surface density in the range of between 0.3 mg/cm² and 1 mg/cm².

17. Process as defined in any one of the preceding claims, characterized in that a carrier structure is produced by rolling carbon powder onto a carrier.
18. Process as defined in claim 17, characterized in that the carbon powder is rolled on mixed with a binding agent.
19. Process as defined in claim 18, characterized in that a hydrophobing material is used as binding agent.
20. Process as defined in claim 18 or 19, characterized in that PTFE is used as binding agent.
21. Process as defined in any one of claims 17 to 20, characterized in that a pore-forming agent is added to the material to be rolled on.
22. Process as defined in any one of claims 17 to 21, characterized in that the composition of the material to be rolled on and/or the particle size therein and/or a contact pressure during the roller application is adjusted.
23. Process as defined in any one of claims 17 to 22, characterized in that the carrier structure is connected to a membrane.
24. Process as defined in claim 23, characterized in that a function layer is sprayed onto the carrier structure and/or onto the membrane prior to their connection.
25. Process as defined in claim 24, characterized in that prior to the connection between carrier structure and membrane a function layer is

sprayed onto a connecting side of the membrane and an oppositely located side.

26. Process as defined in claim 25, characterized in that the respective spraying on is carried out simultaneously.
27. Process as defined in any one of claims 24 to 26, characterized in that the function layer is a reaction layer.
28. Process as defined in any one of claims 24 to 27, characterized in that the connection between carrier structure and membrane is brought about by roller application.
29. Process as defined in any one of claims 23 to 28, characterized in that an additional carrier structure is connected to the carrier structure-membrane connection.
30. Process as defined in claim 29, characterized in that the additional carrier structure is rolled on.
31. Process as defined in claim 29 or 30, characterized in that the additional carrier structure is built up essentially in the same way as the carrier structure first connected to the matrix.
32. Process as defined in any one of claims 29 to 31, characterized in that the additional carrier structure is produced essentially in the same way as the carrier structure first connected to the membrane.
33. Process as defined in any one of claims 23 to 32, characterized in that an electrode-membrane unit for a fuel cell is formed.

34. Process as defined in any one of claims 1 to 16, characterized in that the first layer is a rolled-on reaction layer.
35. Process as defined in claim 34, characterized in that a barrier layer is sprayed onto the rolled-on reaction layer.
36. Process as defined in claim 34 or 35, characterized in that a contact layer is sprayed onto an electrically non-conductive carrier.
37. Process as defined in claim 36, characterized in that essentially the same material as for the barrier layer is used for the contact layer.
38. Process as defined in any one of claims 35 to 37, characterized in that the barrier layer and the contact layer are sprayed on at the same time.
39. Process as defined in any one of claims 34 to 38, characterized in that a membrane is arranged on an outer function layer.
40. Use of an electrode assembly produced according to the process as defined in any one of claims 23 to 32 in a fuel cell.
41. Use of an electrode produced according to the process as defined in any one of claims 1 to 22 or 34 to 39 as a gaseous diffusion electrode.
42. Use of an electrode produced according to the process as defined in any one of claims 1 to 22 or 34 to 39 as an oxygen-consuming electrode.

43. Electrode having a catalytically active reaction layer (100), characterized in that a barrier layer (102) produced by means of a sprayed on powder is arranged on the reaction layer (100).
44. Electrode as defined in claim 43, characterized in that the barrier layer (102) is formed by a mixture of carbon and a hydrophobing material.
45. Electrode as defined in claim 44, characterized in that the hydrophobing material is PTFE.
46. Electrode as defined in any one of claims 43 to 45, characterized in that the barrier layer (102) has a surface density in the range of between 0.4 mg/cm² and 0.8 mg/cm².